ID contributo: **466** Tipo: **Poster**

On-site test measurement for Decay-at-Rest ν_e cross section with Pb : DarVeX

venerdì 21 giugno 2024 17:30 (2 ore)

No method for efficient detection of electron neutrino in MeV energy region has been established so far although there are interesting physics channels in the low energy such as measurement of supernova ν_e, ν_e oscillation and ν_e-nucleus interactions. Lead (Pb) has a novel potential as ν_e target. ν_e is expected to interact with Pb nucleus and produce an electron and neutrons. The interaction is exciting since the cross section is expected to be very large and the delayed coincidence method is available to reduce the backgrounds. Despite such the potential, experimental observation has not been made yet.

The Hg target of 3 GeV proton beam in J-PARC/MLF is a great source of neutrinos. Many π^+ are produced and stops in the target, and they decay to μ^+. The μ^+ also stops in the target and decay to ν_e with mean energy 30 MeV. We are preparing measurement of decay-at-rest ν_e-Pb cross section measurement in the MLF experiment area. Major background sources are fast neutrons and gamma rays related to beam collision to the proton beam target. We performed some test measurements using small detectors to investigate properties of the backgrounds and to search for a good detector location in 2021 and 2022. Then we developed a prototype of a neutrino detector with 1 m [L] x 1 m [W] x 60 cm [H] scale, based on 4 mm thick lead planes and two different types of plastic scintillators with 10 cm and 1cm thickness. The prototype detector contains three layers of 1m x 1m x 4 mm lead planes with total weight of 136 kg as the neutrino target and 2 layers of the plastic scintillator planes with 1 cm thickness sandwiches the lead planes to identify the minimum ionizing electrons. 10 cm thick plastic scintillator bars with Gadolinium sheets also surround the lead and scintillator planes sandwich to measure electron energy and to detect neutrons. The prototype was constructed in the MLF experimental area and was tested in 2023. We started physics data taking to estimate the amount of background level in 2024.

In this presentation, we plan to report first results of the test measurement. We also discuss the possibility of the measurement of the neutrino cross section in future experiments.

Poster prize

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